

REMARKS**Summary of the Office Action**

The drawings stand objected to under 37 C.F.R. § 1.83(a).

Claims 1 and 3 stand rejected under 35 U.S.C. § 103(a) as being obvious over WO 00/65584 and further considered with either JP 10-320835 or U.S. Patent No. 6,130,871 to Watabe (hereinafter "Watabe").

Claims 5 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the art as applied to claims 1 and 3 above, and further in view of U.S. Patent No. 5,708,651 to Sugaya et al. (hereinafter "Sugaya").

Objections to the Drawings

The drawings stand objected to under 37 C.F.R. § 1.83(a). The Office Action asserts that "the array of pits as well as the newly recited angular relationship must be shown or the feature(s) canceled from the claim(s)." Applicants respectfully traverse this objection for at least the following reasons.

Applicants respectfully submit that independent claim 1 describes "information is recorded as an array of pits at a predetermined track pitch." Applicants respectfully submit that this claimed "array of pits" is clearly shown in the drawings of the instant application. For example, Applicants note that this particular feature of embodiments of the disclosure of the instant application is the same as the conventional feature shown in Fig. 1 of the instant application. For example, Fig. 1 illustrates an array of pits on an optical disc. While Fig. 1 is discussed in association with the "Description of the Related Art" portion of the instant

application, the remaining portions of the specification and drawings of the instant application go on to explain in specific detail how various dimensions and specifications associated with the pit array of Fig. 1 can be changed in order to obtain the advantageous combination of features as described, for example, in independent claim 1 of the instant application. It is well understood that 37 C.F.R. § 1.83(a) does not require that such exact dimensions and specifications be shown in the drawings, so long as a detailed description of such is provided in the remaining disclosure. Applicants respectfully submit that the drawings, together with the specification, of the instant application clearly provides a detailed description of such dimensions and specifications.

In addition, Applicants respectfully submit that independent claim 1 describes that “a taper angle of said pits in a direction tangential to the array of the pits is in a range of 80 degrees to 90 degrees.” Applicants respectfully submit that this claimed “taper angle” is clearly shown in the drawings of the instant application. Applicants note that this particular feature is shown, for example, by the angle θ in Figs. 8A and 8B of the instant application. Even further, Applicants note that the relationship between the taper angle and the gain fluctuation is depicted in Figs. 5 and 6. Even further, a detailed explanation of this “taper angle” feature was presented in the previous Amendment originally filed on August 2, 2005 in this application. This detailed explanation provides additional directives as to how this “taper angle” feature is illustrated in the drawings.

Accordingly, withdrawal of the objection to the drawings is respectfully requested.

Rejections under 35 U.S.C. § 103(a)

Claims 1 and 3 stand rejected under 35 U.S.C. § 103(a) as being obvious over WO 00/65584 and further considered with either JP 10-320835 or Watabe. Claims 5 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the art as applied to claims 1 and 3 above, and further in view of Sugaya. Applicants respectfully traverse these rejections for at least the following reasons.

The rejections under 35 U.S.C. § 103(a) were generally repeated from the previous Office Action despite the detailed technical traversal in the Amendment that was previously filed by Applicants in this application on August 2, 2005. For example, at pages 5-8 of the Amendment that was previously filed by Applicants in this application on August 2, 2005, detailed arguments traversing the combination of the applied references under 35 U.S.C. § 103(a) were presented.

The only response to these arguments in the latest Office Action dated November 1, 2005 is found at page 5, in which the Examiner notes that “applicants’ arguments focus on the newly introduced angular relationship in the tangential direction, i.e., that the prior art cited fails to depict an angular relationship in this direction.”

While Applicants agree that this argument was presented, additional arguments were also presented regarding why the references applied in the Office Action are not combinable. In the event that these rejections might be maintained in a future Office Communication, the Examiner is respectfully requested to specifically respond to the technical assertions presented at pages 5-8 of the Amendment that was previously filed by Applicants in this application on August 2, 2005, as well as the technical assertions presented herein. It is respectfully submitted that the technical

assertions previously filed by Applicants in this application on August 2, 2005 are still applicable.

Moreover, at the above-discussed portion at page 5 of the latest Office Action dated November 1, 2005, the Examiner notes that “applicants’ arguments focus on the newly introduced angular relationship in the tangential direction, i.e., that the prior art cited fails to depict an angular relationship in this direction.” In response, the Examiner concedes that he “agrees that there is no clear depiction of such.” Nevertheless, the Examiner then goes on to assert that he simply “concludes that such is present.” Applicants respectfully submit that, for at least the following reasons, this particular feature is particularly advantageous and is neither shown nor suggested by the applied art, especially as specifically described in independent claim 1 of the instant application. Accordingly, in the event that the Examiner might maintain such an assertion in a future Office Communication, he is respectfully requested to present a reference that does in fact clearly depict this feature.

In addition to the technical traversals discussed above, the rejections under 35 U.S.C. § 103(a) are further traversed for at least the following reasons.

At page 4 of the Office Action, the Examiner concedes that the primary reference WO 00/65584 does not disclose the feature of independent claim 1 in that a taper angle of the pits in a direction tangential to the array of the pits is in a range of 80 degrees to 90 degrees.

The Examiner then goes on to apply the first of the alternatively-applied secondary references, Japanese Patent Kokai No. 10-320835, as allegedly meeting these features. Such an assertion is respectfully traversed for at least the following reasons. Applicants respectfully submit that the JP 10-320835 reference relates to an optical system having optical parameters

that are particularly different from those of the embodiments of the disclosure of the instant application. For example, the wavelength of the reproduction beam is longer than that of the embodiments of the disclosure of the instant application. Even further, the numerical aperture NA of the objection lens is smaller than that of the objective lens used for reproduction in the embodiments of the disclosure of the instant application.

Applicants respectfully submit that, as explained with reference to specific equations presented in the specification of the instant application, the wavefront aberration increases as the reproduction wavelength decreases. The wavefront aberration also increases as the numerical aperture NA increases.

Applicants respectfully submit that the increase in the wavefront aberration causes various adverse effects. As explained in the specification of the instant application, the gain fluctuation in the phase-difference type tracking error detection is a typical example of such adverse effects.

Applicants note that in conventional disc systems, such as the DVD system disclosed in the applied JP10-320835 reference, the wavefront aberration due to defocusing and errors in thickness of the light-transmission layer is of a small enough nature so as not to result in such adverse effects when the phase-difference type tracking error detection is adopted. More particularly, the detection signal (tracking error detection signal) that is obtained by the phase-difference type tracking error detection is not adversely affected by the wavefront aberration in such conventional disc systems.

On the other hand, Applicants respectfully submit that an object of embodiments of the disclosure of the instant application is to prevent a gain (amplitude) fluctuation of the tracking

error detection signal that is obtained by the phase-difference method in an optical disc system utilizing a shorter wavelength (ranging from 400 nm to 415 nm) and a higher numerical aperture NA (ranging from 0.75 to 0.86) than in the conventional optical disc systems. These specific specifications and dimensions are specifically described in the novel combination of independent claim 1 of the instant application.

Applicants respectfully submit that, in general, the tracking error detection signal in the phase-difference method is only affected to a small extent by the physical shape of the pits in the radial direction of the disc. On the other hand, the tracking error detection signal is affected to a large extent by the physical shape of the pits in the tangential direction (the time base direction). As a result, Applicants respectfully submit that the effect of the physical shape of the pits in the tangential direction plays a significant role in embodiments of the disclosure of the instant application when considering the gain fluctuation of the tracking error detection signal as it is affected by the wavefront aberration, as discussed previously.

Applicants note that, according to embodiments of the disclosure of the instant application, as described in independent claim 1, the taper angle of the pits is set in a range from 80 degrees to 90 degrees in order to prevent the gain fluctuation generation of the phase error tracking error detection signal.

In addition to the foregoing differences between the disclosure of the instant application and the disclosure of the applied JP10-320835 reference, Applicants respectfully submit that the JP10-320835 reference discloses a taper angle in the disc's radial direction. Even though JP10-320835 discloses a taper angle which is 80 degrees or higher, Applicants note that paragraph

0021 clearly indicates that this taper angle is in the disc's radial direction in that it is described as being between the land and groove in the shape of a spiral.

Accordingly, Applicants respectfully submit that even assuming, strictly arguendo, that one skilled in the art might be led to make the combination applied in the Office Action of specific features of JP10-320835 together with features of the optical disc of WO00/65584, it would not be possible to obtain the advantageous effects of the disclosure of the instant application of preventing the gain fluctuation of the tracking error detection signal obtained by the phase difference method.

Applicants respectfully submit that similar arguments as described above regarding the differences in the optical parameters between embodiments of the disclosure of the instant application and JP10-320835 also apply to the alternatively-applied secondary reference to Watabe. For example, Watabe does not cure the deficiencies of WO/65584 and JP10-320835 in this regard for at least the following reasons.

Watabe discloses an optical disk apparatus in which reproduction occurs from pits that are formed on the disc according to the conventional DVD format. Watabe discusses, at col. 6, lines 32-35, that "it is realistic to form a pit having a wall surface angle θ equal to or larger than approx. 30 degrees (not more than 90 degrees)." However, Applicants respectfully submit in this regard that this disclosure merely indicates that the wall surface angle θ below 30 degrees is not realistic in DVD discs because the wall surface angle θ cannot exceed 90 degrees as a matter of course.

Accordingly, Applicants respectfully submit that Watabe does not disclose, or even suggest, the selection of a taper angle in a range of 80 degrees to 90 degrees, as described in

independent claim 1 of the instant application. Applicants note that this discussion is also relevant with regard to the subject matter of dependent claim 3 of the instant application.

As a result, Applicants respectfully submit that even assuming, strictly arguendo, that one skilled in the art might be led to make the combination applied in the Office Action of specific features of JP10-320835 or Watabe, together with features of the optical disc of WO00/65584, the claimed features of the novel combination described in independent claim 1 would still not be attained. Even further, Applicants respectfully submit that such a novel combination would not be obvious, in light of the advantageous features that result from the specific combination of features described in independent claim 1. Applicants will now further respond to the Office Action with the following additional technical points explaining how the novel combination of features described in independent claim 1 of the instant application are not obvious over the applied references, whether taken separately or in combination with each other.

Applicants respectfully submit that there is a significant difference with regard to the ease of controlling the taper angle when forming the pits by the disc manufacturing apparatus between a taper angle formed in the radial direction with a taper angle formed in the tangential direction. More particularly, the taper angle in the disc's radial direction can be controlled relatively easily by varying the recording laser power. On the other hand, the taper angle in the tangential direction varies depending on the pit length. In other words, Applicants respectfully submit that the control of the taper angle in the tangential direction is enabled only when the time duration and power of the recording laser beam are controlled accurately. Applicants note that if the laser beam is simply controlled in an on-off nature according to the recording signal, the resulting pits

that are formed would have diverse taper angles, especially those taper angles formed in the tangential direction.

Applicants note further in this regard that if pits are formed in this way in a conventional DVD disc, reproduction can still be performed, even in light of the above-discussed diverse taper angles and associated issues. However, with regard to the novel discs of embodiments of the disclosure of the instant application that are reproduced with an optical system having a short wavelength and a high numerical aperture NA, the adverse effects of the wavefront aberration would become too significant to perform an accurate reproduction.

Accordingly, Applicants respectfully submit that the disclosures of each of the cited references, which only concern the taper angle in the disc's radial direction, are clearly different from the embodiments of the disclosure of the instant application at least in these important technical points discussed previously.

In summary, Applicants respectfully submit that the novel optical disc combination described in independent claim 1 includes a specific combination of dimensions and specifications that achieves a significant effect of drastically increasing the recording density by reducing the adverse effect of wavefront aberration. As a result, these features could not be attained with the conventional optical discs. One having ordinary skill in the art would not be led to make the Office Action's discussed changes to the disclosures of the applied references teaching conventional DVD disc arrangements for at least the foregoing reasons.

Accordingly, Applicants respectfully assert that the rejections of independent claim 1 under 35 U.S.C. § 103(a) should be withdrawn because none of WO 00/65584, Japanese Patent Kokai No. 10-320835 or Watabe, whether taken singly or combined, teach or suggest each

feature of independent claim 1, as amended. MPEP § 2143.03 instructs that “[t]o establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 409 F.2d 981, 180 USPQ 580 (CCPA 1974).” Furthermore, Applicants respectfully assert that dependent claims 3, 5 and 7 are allowable at least because of their dependence from claim 1 and the reasons set forth above, and because the additionally applied reference to Sugaya with regard to claims 5 and 7, does not cure the deficiencies of the art as applied to claims 1 and 3, as discussed above.

CONCLUSION

In view of the foregoing remarks, Applicants submit that the pending claims are in condition for allowance, and respectfully request reconsideration and timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants’ undersigned representative to expedite prosecution.

Except for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including

any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573.

This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

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